

## **REMARKS**

In view of the following remarks, Applicants respectfully request reexamination of the present application. The foregoing Listing of Claims is presented for the convenience of the Examiner. No claims have been amended, no claims have been cancelled and no new claims have been added. Claims 1-5, 9-23 and 47-49 are pending.

### **Rejections – Double Patenting**

The Examiner has maintained the rejections of Claims 1-3, 9-16 and 47 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-18 of U.S. Patent No. 6,660,680 by Hampden-Smith et al. The Examiner states that although the conflicting claims are not identical, they are not patentably distinct from each other because both the claims in the instant application and in the patent are directed to a powder batch comprising electrocatalyst particles comprising a support phase and an active species phase. The Examiner also states that a comparison of the respective sets of claims exhibits overlapping ranges of (1) the average particle size for the support phase, (2) the cluster size of the active species phase, and (3) the surface area of the electrocatalyst particles.

The Examiner states that the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness. *In re Malagari*, 182 U.S.P.Q. 549.

Applicants have enclosed the appropriate Terminal Disclaimer and therefore request removal of this rejection.

### **Rejections – 35 U.S.C. § 103**

The Examiner has maintained the rejection Claims 1-5, 9-23 and 47-49 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,876,867 by Itoh et al.

The Examiner states that Itoh et al. teach electrocatalyst particles comprising platinum or an alloy thereof (considered to read upon the phrase “active species phase”) supported on a conductive carbon powder (considered to read upon the phrase “support

phase"). The Examiner states that the platinum (or platinum alloy) of Itoh et al. may be supported on the conductive carbon carrier in an amount of 1% to 60% by weight based on the whole catalyst.

The Examiner also states that the platinum (or platinum alloy) has no particular limitations on the characteristics of crystallite diameter or surface area. However, the Examiner states that preferable ranges are 15-100 Å and 30-200 m<sup>2</sup>/g, respectively.

In conclusion, the Examiner admits that Itoh et al. do not teach the specifically claimed ranges of, for example, the particle sizes of the "support phase" and "active species phase". However, the Examiner is of the opinion that Itoh et al. teaches values for these (and other) characteristics that *overlap* those respectively claimed and that the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness. *In re Malgari*, 182 U.S.P.Q. 549.

Applicants respectfully submit that Itoh et al. do not disclose or suggest the claimed ranges of electrocatalyst particle size and active species phase cluster size, and further that Itoh et al. do not even teach values for these characteristics that overlap those claimed. Further, these characteristics are not inherent in the electrocatalyst powders disclosed by Itoh et al.

Obviousness cannot be predicated on what is not known at the time an invention is made, even if the inherency of a certain feature is later established. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *Rijckaert*. To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic

necessarily flows from the teachings of the applied prior art. *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

### **Average Cluster Size**

Applicants respectfully maintain that the present invention is novel and non-obvious in view of Itoh et al. in several respects, including the claimed average cluster size for the active species phase. This aspect of the claimed invention is discussed in detail at page 18, lines 10-22 of the present specification. The cluster size refers to the size of the independent small regions of active species phase dispersed on the support phase – it is roughly analogous to an average particle size, in that individual regions of active species can be, and usually are, composed of many randomly oriented crystallites. In the prior art such as Itoh et al., extended heating times at elevated temperatures cause the active species to migrate on the support structure and form relatively large agglomerates of the active species.

Independent Claim 1 specifically recites that the average cluster size of the active species phase is not greater than about 20 nanometers.

Itoh et al. discloses a preferred *crystallite diameter* of 15 to 100 Å as determined by x-ray diffraction (Col. 7, lines 49-57), e.g., using the Debye-Scherrer formula. X-ray diffraction only reveals information regarding the size of crystallites. An active species cluster can be composed of many crystallites, each having a size of 15 to 100 Å, where the average cluster size is much larger, such as greater than about 20 nanometers.

With respect to Applicants' prior arguments, the Examiner disagrees regarding the claimed active species cluster size in relation to the prior art. The Examiner states that the teaching of Itoh et al. of a platinum/platinum alloy crystallite diameter of 15–100 Å (1.5 to 10 nm) is considered to read upon the limitation “not greater than about 20 nm” and the Examiner points out that although the instant claims recite a “cluster size” the claims do not indicate just how many particles are required to obtain a “cluster”. The Examiner concludes that a cluster comprising two particles, each having diameters of between 1.5 and 10 nanometers, would read on the aforementioned claim limitation. Applicants agree that if the electrocatalyst of Itoh et al. was comprised of many clusters of two crystallites, each having a size of between 1.5 and 10 nanometers, then the *average* cluster size would

be not greater than 20 nanometers. However, Itoh et al. does not disclose or fairly suggest such a structure.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *Rijckaert*. To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. *In re Robertson*.

It is submitted that the method of Itoh et al. is *not capable* of forming an active species phase with an average cluster size of not greater than about 20 nanometers due in part to the process steps taught by Itoh et al., and therefore is *not* an inherent feature of Itoh et al.

The Examiner points out that the Itoh et al. reference is relied upon for its teachings with respect to the electrocatalyst disclosed therein, not the method by which the electrocatalyst is produced. However, Applicants only refer to the method of Itoh et al. in order to better assess the structural properties of the electrocatalyst product. Applicants' position is that the composite electrocatalyst particles disclosed by Itoh et al. do not have the recited average cluster size because, *inter alia*, the method disclosed by Itoh et al. is not capable of forming electrocatalyst particles having such a small average cluster size.

More specifically, the method of Itoh et al. requires that the particles be heated to an elevated temperature of from 750°C to 1000°C, and more preferably from 800°C to 900°C, for a retention time of from one minute to 5 hours, and more preferably from 20 minutes to 2 hours. (Column 5, lines 32-36). In the examples disclosed by Itoh et al., the particles are heated at a temperature of 900°C for 1.2 hours to form an alloy. (Column 10, lines 27-31). *Such high temperatures for extended periods of time are known to cause surface diffusion of the metallic phase and clustering of the metallic phase on the support surface.*

As is disclosed in the present specification, at page 24, line 30 through page 25, line 3;

Spray conversion or spray pyrolysis is a valuable processing method because the particles are raised to a high temperature for a *short period of time*. The relatively high temperature achieves conversion of the molecular precursor to the final desired phase, but the short time *insures little surface diffusion that can cause agglomeration of the nanometer-size active phase*. Hence, the support phase is formed with well dispersed nanometer sized active phase particles". (Emphasis added)

A well-dispersed active species phase (i.e., small active species phase clusters) is important for good catalytic activity.

In conclusion, although Itoh et al. discloses that the average crystallite diameter measured by x-ray diffraction is in the range of 15 to 100 Å, an active species cluster size of not greater than 20 nanometers (Claim 1) or not greater than 10 nanometers (Claim 17) is not inherent in the disclosure of Itoh et al.

#### **Average Particle Size**

In addition, with respect to dependent Claims 12-13 and Claim 17, Applicants maintain that Itoh et al. do not disclose the recited average particle size. Itoh et al. do disclose that the electrocatalyst support can have a graphite *crystallite diameter* of from 7 to 80 Å. However, as with the active species cluster size, this provides no information relating to the actual *particle size* of the carbon particles. Indeed, it would be difficult to achieve a *particle size* of 7 Å. Since as the method of Itoh et al. discussed above does not appear to produce agglomerated primary support particles forming the electrocatalyst particles, it is respectfully submitted that the claimed size ranges are not disclosed or suggested by Itoh et al., nor are they inherent in the disclosure of Itoh et al.

In view of the foregoing, Applicants request reconsideration of Claims 1-5, 9-23 and 47-49.

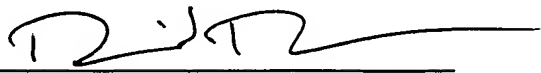
Applicants do not believe that any additional fees are due with respect to this response. However, if it is determined that any such fees are due, please debit those fees from Deposit Account No. 50-1419.

Applicants believe that all pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecute and or expedite allowance, the Examiner is invited to contact the undersigned.

Respectfully submitted,

MARSH FISCHMANN & BREYFOGLE LLP

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By: 

David F. Dockery  
Registration No. 34,323  
3151 South Vaughn Way, Suite 411  
Aurora, Colorado 80014  
Phone: (303) 338-0997